The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Technical Men in the Civil Service

THE popular reaction in times when things do not go well is to look for a scapegoat. We know all too well that for years past popular writers have been blaming science for putting the weapons of destruction into the hands of destructive forces. This attitude has been summed up by a well-known novelist in words put into the mouth of one of his characters: " I hate and fear Science because of my conviction that, for long to come, if not for ever, it will be the remorseless enemy of mankind. I see it destroying all simplicity and gentleness of life, all the beauty of the world. I see it restoring barbarism under a mask of civilisation; I see it darkening men's minds and hardening their hearts; I see it bringing a time of vast conflicts, which will put into insignificance the thousand wars of old, and as likely as not, will overwhelm all the laborious advances of mankind in blood-drenched chaos." As contrasted with this, the view has been expressed that the future of mankind lies in the increasing use of science whereby more and more scientific men may be encouraged to take part in politics and to lead political thought, while at the same time the discoveries of science will provide us with new industries and lead to a fuller life. A recent leading article in *The Times* on this subject, based upon Dr. G. H. Hardy's book " A Mathematician's Apology," puts forward the proposition that the scientist can claim acquittal from the charge of causing all the ills from which we are now suffering on the ground that high matters of policy are above his professional competence because he is employed only to investigate what happens under certain conditions and when he has given an answer to that question he is not responsible for what use others make of the answer.

It has always seemed to us that in these discussions dealing with science, politics, and general human well-being too much stress is placed upon pure science and too little upon the technical scientist. The pure scientist is usually so far removed from the repercussions of the practical world that he is ill qualified to embark upon ruling the lives of ordinary human beings; the technical man who is in daily touch with industry is far better suited for that role. Dr. A. V. Hill, M.P., in a recent address to the Parliamentary and Scientific Committee of the House of Commons, already reported in our columns, put forward some suggestions on the place of what he termed " scientists " in the Civil Service and in the general government of of the country. We should be disposed to agree with a good many of his suggestions if for the Royal Society he would substitute a composite body more in touch with the realities of industrial life.

Dr. Hill observed that the Royal Society has been frequently consulted by the Government in every generation and is now assigned the task of advising the War Cabinet on scientific matters; he looked forward to the continuance of this advisory function after the war. In this closer association of science with government he emphasised five possible dangers against which provision must be made. Firstly, there was the risk that stagnation might develop in any scientific department cut off from outside criticism or ideas. Associated with this was the danger that science might be " planned by administrators in offices instead of by young men with their sleeves rolled up, in laboratories or workshops." Thirdly, there was the " disadvantage " of separating teaching from research, with the loss of the inspiration afforded to the younger generation of embryo scientists by seeing discovery going on in the places where they were taught. Fourthly, there was the decrease in the influence and prestige of the independent scientific bodies which linked together the activities of groups which otherwise might be isolated. Finally, there was the danger that, there might be more frequent demands that research should be devoted primarily to objects which the politician or the civil servant regarded for the moment as being of national importance.

We are not at all convinced that there is a disadvantage in separating teaching from research; important research should not be the part-time work of a teacher, or vice versa; there is plenty of opportunity to teach research students by giving them junior work to do in research laboratories. Dr. Hill's safeguards, particularly against the first of the dangers he notes, include, first, the introduction into each department of the Government a Scientific Advisory Council composed of intelligent " scientific " men and also of official scientific representatives of the department. Secondly, he proposes a regular interchange of personnel between Government research establishments and independent institutions where research is carried on. The interchangeability of civil servants with those in the outside world appears a suggestion of considerable value, provided that those from outside can be safeguarded from the risk of becoming imbued with civil service caution and red tape. There is, we repeat, a good deal of value in Dr. Hill's suggestions provided that he will include in his scheme a majority of men with a wide knowledge of the technical side of industry.

NOTES AND COMMENTS

Insurance for All

ALMOST everyone in the country will be affected by the Government's War Damage Bill which was given Royal assent on Wednesday. This far-reaching war-time insurance scheme is in two parts. Part I, which applies to real property—houses, other buildings and land—is to be administered by a new Governmental body, the War Damage Commission. The Commission is being constituted and an early announcement of its personnel is expected. Part II relates to movable property—plant, machinery, business equipment, farm implements, crops, livestock and produce, furniture, clothing, and personal effects. It includes three distinct schemes: one for businesses, another for farmers, and a third for householders and other owners of "private chattels." "Businesses," for this purpose, includes manufacturers and traders, professional men and women, local authorities, hospitals, churches, universities, charitable and other institutions. Responsibility for administering the schemes under Part II will fall upon the Board of Trade, which already administers the war risks commodity insurance scheme. The Board is setting up an Insurance Department to deal with all the insurance work falling upon the Board including that arising from Part II of the War Damage Bill and commodity insurance. The Board will not issue policies directly to policy holders. To avoid a "bottleneck" and enable insurance to be effected in a convenient way, familiar to them, insured persons will obtain their policies through their own brokers or fire insurance companies. With certain exceptions insurance under the business and farm schemes will be compulsory. Under the private chattels scheme, householders and others who wish to insure beyond the limits of free cover will be able to do so up to a total amount of £10,000.

A Notable Chemical Target

THERE is every reason to believe that during December and January the R.A.F. succeeded in inflicting some substantial damage on Germany's war effort, more, in fact, than the Luftwaffe succeeded in inflicting in this country. Not the least important part of our interference with German war industries is the destructive action taken against the large chemical plants in the neighbourhood of Mannheim. Mannheim is the most important industrial and commercial centre of the middle Rhine. The old town occupies the tongue of land between the Rhine and its tributary the Neckar, while at the confluence of the streams is the largest inland port in Europe after Duisburg. The principal chemical works are, however, in the suburbs on both banks of the Rhine. To the north of the Neckar, at Waldhof, Käfertal, and Neckarstadt are the main works of the Zellstoff Fabrik Waldhof A.G. pulp and paper combine, important motor and engine works, and heavy chemical plant. To the south of Mannheim, on the east bank of the Rhine, are the industrial suburbs of Neckarau and Rheinau. Here are the steelworks of the Stahlwerk Mannheim A.G., the soap works of the Sunlicht Gesellschaft A.G., and several chemical works, including the important plant of the Chemische Fabrik Buckau A.G. It was in Rheinau that the Bergius oil-from-coal process was first developed. The experimental works are still there and have recently been devoted to the production of sugar from wood on a semi-commercial scale.

Problems for the Badische Works

WEST of the Rhine lie Ludwigshafen, Oppau, and Mündenheim, where the chief feature, industrially speaking, is the enormous group of vital chemical works. The Badische Anilin-und-Soda Fabrik (a branch of I.G. Farbenindustrie) is famous throughout the world for its dyestuffs, and in its Ludwigshafen works includes one of the largest sulphuric acid plants in Germany. The adjacent Oppau works comprise a large synthetic ammonia plant (the first full-scale plant using the Haber-Bosch process to be erected) and an alkali plant, and produce a wide range of heavy and other chemicals. At Mündenheim the Giulini alumina works constitute an important unit of the German aluminium industry. Other smaller industrial enterprises of all kinds are scattered throughout the area. The raids on Mannheim have inflicted widespread damage on all manner of installations. Production in the shipyards has been held up; many of the engineering shops have been completely destroyed or damaged. The Ludwigshafen works of the Badische Anilin-und-Soda Fabrik have been extensively damaged and the Oppau works have also suffered. There is reason to believe that the damage inflicted has set the German chemical industry some difficult problems. Other works, including the Zellstoff Fabrik Waldhof, have received minor damage. Adding to these the very many hits scored on railway tracks and transport generally (one of which broke the connection across the Rhine between Mannheim and Ludwigshafen for some days), it is not surprising to hear it officially stated that industrial life in Mannheim must have been somewhat abnormal for several weeks after these raids.

Inventions: their Use and Misuse

SIR RICHARD GREGORY, delivering the Aldred Lecture before the Royal Society of Arts on Wednesday, chose as his subject "Discovery and Invention," a subject on which no one is better qualified to discourse than the learned editor of *Nature*. The major part of his lecture was devoted to an interesting discussion of some of the most conspicuous inventions of the age: the applications of X-rays, radio-communication, Hadfield's work on metals, and the utilisation of the Joule-Thomson effect. It is more pertinent to comment here, however, on his *obiter dicta*, some of which were characterisally "Gregorian." Who, for instance, could better his distinctive definition of discovery and invention? "In general understanding," he says, "a scientific discovery is an addition to natural knowledge, and an invention an additional use of knowledge." And again, when he speaks of how "the most profitable inventions have become those which can be used for the destruction of human life and property," we cannot refrain from quoting a paragraph. "Two examples of this dehumanising use of old knowledge are afforded by chlorine and glycerine, both of which were discovered by the Swedish apothecary Scheele in the last quarter of the 18th century. The use of chlorine in the manufacture of bleaching powder was patented about a quarter of a century later, but it was not until 1915 that the Germans first used it as a poison gas at Ypres. Similarly, mustard gas, which was first used on the battlefield by Germany in 1917, was discovered in a scientific laboratory nearly a century earlier. Scheele's glycerine did not become of any industrial value until many years after its discovery, when a patent was granted for a process of making it. It was the discovery of nitro-glycerine by Nobel in 1883 that enormously increased the importance of glycerine as an industrial product."

The Tobacco Plant

TOBACCO-SEED oil bids fair to play a more prominent part than heretofore in the economy of nations, thanks to the difficulties of supply of other more commonly-used vegetable oils. For example, Dr. Koenig, Director of the German Tobacco Research Institute, reports that his Institute has extracted from tobacco-seed an edible oil having the flavour of peanut oil, and that an oilcake is made from the seed. The Indian Government, too, is reported to be studying the possibilities of tobacco-seed oil; in this case it is claimed that the oil extracted smells and tastes like sesame oil, and generally contains no nicotine. In the Balkans tobacco-seed oil is not a novel product, especially in Bulgaria, where it has been used for years as a cooking and salad oil. Here and in Yugoslavia, however, the promotion of its production on a larger scale is said to be on foot, in view of the shortage of other cooking oils. The indefatigable Dr. Koenig, by the way, has found a further use for the tobacco plant, namely, as a source of a "new German perfume" which is distilled from the blossoms and is said to have the scent of hyacinths and carnations combined.

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Electrolysis in the Chemical Industries*

A Review of Electrochemistry : Its Present and Future

ALTHOUGH many of the electrolytic processes of to-day can trace their origin to laboratory experiments carried out by Davy, Faraday, and others over a hundred years ago, the electrochemical industry, as we know it, is less than 60 years old. Its phenomenal growth is due to a number of obvious factors: the production of cheaper and purer products, utilisation of hydroelectric power, conservation of natural resources, and better working conditions. But all these factors, which we admit have contributed so largely to the commercial success of electrolytic processes, are fundamentally dependent on certain potent electrochemical phenomena which are as yet little understood. These phenomena and the mechanisms involved make it possible to consummate reactions with comparative ease—reactions that are frequently well-nigh impossible by methods other than electrolytic. Thus, many reductions are carried out at the cathode at room temperature—reductions which without electrolysis would require either very high temperatures or the use of strong reducing agents or both. To convert chromium oxide to chromium metal without electrolysis necessitates the interaction with a powerful reducing agent such as silicon, aluminium, or carbon, heated to white heat, whereas chromium oxide is reduced to metal electrolytically easily at room temperature, not to mention the higher purity of the electrolytic metal as compared with that produced thermally. Similarly, electrolytic oxidation is more powerful than oxidation by reagents such as peroxides, dichromates, etc.

Another advantage of electrolytic methods is the ease and nicety with which the energy input for a desired chemical reaction may be controlled so as to favour one or the other of a number of products. In addition, the required energy is introduced into the reaction chamber from within instead of from without through thick chamber walls, and consequently is more efficient.

Very striking in electrolytically reduced metals, though still not satisfactorily accounted for, are the pure crystals, frequently many inches long, whereas chemically reduced metals from solutions are usually black and powdery or spongy.

The Alkali-Chlorine Industry

There are many striking illustrations of the pronounced and stimulating effect on the older chemical industries due to the introduction of electrolytic processes. The alkali-chlorine industry, for instance, is based on a very simple electrolytic reaction:

$$NaCl + H_2O = NaOH + H + Cl,$$

which should be compared with the old Leblanc process involving half a dozen steps.

The first American commercial electrolytic alkali-chlorine plant was built at Rumford Falls, Maine, in 1892. The Mathieson Alkali Works at Saltville, Va., installed the first Castner mercury cells in 1895, and shortly after moved to Niagara Falls. To-day, there are 50 electrolytic alkali-chlorine plants in 20 different states of the Union. According to a recent report of the Federal Power Commission, the manufacture of electrolytic chlorine requires about 40 per cent. of the total electrolytic energy consumed in the United States, and about 20 per cent. of that consumed in both electrolytic and electrothermal industries. The chlorine industry is the third largest consumer of electricity in the process industries, exceeded only by the aluminium industry and the electric furnace ferro-alloy industry. Chlorine manufacture to-day consumes over 2,000,000,000 kilowatt hours per year, representing an annual expenditure of $10,000,000 for power alone.

In 1890 practically all the chlorine produced was converted into bleaching powder. To-day, less than half the chlorine is used for this purpose, in spite of a thousandfold increase in consumption of chlorine by the bleaching industries. In consequence of the bountiful supply and low cost of chlorine an entirely new and diversified field of industrial application of chlorine has developed. Over half the chlorine produced to-day enters the manufacture of organic chemicals, foremost among which are ethylene glycol and its derivatives. Other applications include the chlorination of rubber, refining of Texas crude oil, cracking of petroleum, the conversion of pinewood into rayon pulp, and the sterilisation of drinking water and of sewage.

The large-scale application of chlorine in the recovery of bromine from the sea is in operation on the coasts of North Carolina and Texas. No chemist can contemplate this industrial accomplishment without visualising the extraction of other products from the sea. The new Freeport (Texas) plant will include magnesium as a by-product or even as a major product.

Liquid chlorine is to-day shipped in tank cars holding 30 tons and more. The annual production of chlorine in the United States has reached the stupendous figure of 500,000 tons, equivalent to a train of 17,000 tank cars of liquid chlorine.

Sodium Metal

Included among the two-score products of the chlorine industry is metallic sodium, rivalling chlorine in importance and diversified application. Fifty years ago the price of metallic sodium was $2.00 per lb.; now it is 14 cents per lb. Almost all the sodium metal produced—many thousand tons—enters the organic chemical products field, whereas 50 years ago the interest in metallic sodium centred on its application as the necessary reducing agent for the production of metallic aluminium:

$$AlCl_3 + 3Na = Al + 3NaCl,$$

and with a reducing agent costing $2.00 per lb., it was not possible to produce aluminium metal for much less than $10 per lb.

Inspired by the idea of making cheap sodium metal in order to produce cheap aluminium metal, Hamilton Y. Castner, at Columbia University, tackled the problem in 1885. Previously sodium metal was being made commercially, but on a very limited scale, by the reduction of sodium carbonate with charcoal. Castner studied this process and succeeded in improving upon the output efficiency by substituting the lower melting caustic soda for the carbonate of soda and by replacing the charcoal by the more active iron carbide.

The process which he originated was such an improvement that the price of aluminium metal dropped from $10 per lb. to $5.00. The Castner iron carbide process was put into commercial operation in 1887 at Oldbury, England, and the aluminium reduction plant was set up next door.

For three years the Oldbury works practically monopolised the manufacture of aluminium (and of sodium metal as well), but while the English factory was making aluminium by reduction with sodium, far-reaching discoveries and developments in the direct process for aluminium were being recorded by Hall in America and Héroult in France. The electrolytic cryolite process that they discovered was soon used for metallic aluminium throughout the world and remains in use to this day.

Castner continued his researches on sodium metal and in 1890 succeeded in making the metal by the electrolysis of fused caustic soda, a process still in practice even though superseded in part by the more difficult but cheaper fused sodium chloride process of Downs, Danneel, and others. With the advent of the Castner electrolytic process, so much simpler and more efficient, the older chemical processes, including his own iron carbide process, were soon driven out

* From a paper by C. G. Fink, Professor of Electrochemistry at Columbia University, presented at the National Industrial Chemical Conference, Chicago, December 1940 (*A.C.S. News Ed.*, 1941, *19*, 4, 193).

of existence. In time the price for the chemically produced sodium metal dropped to 10 and 20 cents per lb., and now, next to iron, sodium is the cheapest of all metals on the unit volume basis, with a world production of over 300,000 tons per annum. In consequence, an entirely new field of industrial application for sodium metal opened. Numerous organic chemicals of to-day would be non-existent without cheap, electrolytic sodium metal. Tetraethyl lead and indigo are two of the important products made with sodium metal. Other products are sodium peroxide and synthetic perfumes. A minor, but nevertheless important, application of sodium metal is in the sodium arc lamp.

Castner's final contribution to the electrochemical industry was his alkali-chlorine cell, using a mercury cathode. This cell, in spite of its very costly cathode, is in extensive use. Its chief merit lies in the high purity of the caustic produced as compared with that of the more popular and cheaper diaphragm cells.

Aluminium and Magnesium

In 1888 the production of aluminium in the United States amounted to 7 tons, valued at $65,000 or $4.64 per lb. In 1940 the United States produced 200,000 tons, valued at about 15 cents per pound. It will again be appreciated that low-cost aluminium initiated applications of the metal that were not to be considered 50 years ago. Thus, one of the chief uses of aluminium from a chemical point of view is as a scavenger in the steel industry—aluminium's affinity for oxygen at elevated temperatures exceeding by far that of iron. Minor, but industrially significant, uses in the chemical industry include the aluminothermic mixture of ferric oxide and grained aluminium for welding large masses of iron and steel where the acetylene torch is not applicable, the aluminothermic "blasting" of icebergs (the only practical method of removing these constant menaces to shipping), the use of aluminium metal powder in paints, and the application of aluminium metal in organic chemical processes.

Aluminium amalgam is a useful reducing agent in the presence of water; through its application nitro derivatives are readily transformed into hydroxylamines, and ketones to secondary alcohols. Aluminium metal catalyst is used for the condensation of chlorinated paraffin wax with aromatic hydrocarbons, for the synthesis of lubricating oils, and for the hydrogenation of abietyl compounds.

A competitor of aluminium is magnesium. Physical and mechanical properties of certain magnesium-rich alloys have as yet not been paralleled by corresponding aluminium alloys. Just as the first commercial aluminium was produced by the interaction of aluminium chloride and metallic sodium, so likewise was the first commercial magnesium metal produced by the interaction of magnesium chloride and metallic sodium. The Magnesium Metal Co. of England started production in 1863 and in 1865 established an American factory at Boston. The sodium method of production of magnesium metal, principally as ribbon for photographic purposes, continued for almost 30 years, when Germany perfected the much cheaper and more efficient electrolytic process. A molten bath of fused carnallite, the double chloride of magnesium and potassium, was used, large quantities of which were and are available in Germany. Nevertheless, the standard process to-day for making magnesium metal in America as well as abroad is the electrolytic fused chloride process.

The rapid growth of the magnesium industry is due largely to the outstanding mechanical properties of magnesium-rich alloys. The resistance to fatigue is particularly noteworthy. In this respect the magnesium-rich alloys, such as the Dow-metals, excel nearly all other metals and alloys.

Apart from the thousands of applications of magnesium in the mechanical field, small but significant and indispensable amounts of the pure metal, so readily available to-day, are consumed in various important chemical reactions. Thus, magnesium metal is a fundamental scavenger reagent in the vacuum tube industry. Its particular value is due to exceptionally high chemical affinities at elevated temperatures. Magnesium vapour readily reacts and combines with oxygen, nitrogen, water vapour, carbon dioxide, and carbon monoxide—with almost every gas except argon and other "noble" gases. Furthermore, on account of this high chemical affinity at elevated temperatures, magnesium metal is the preferred scavenger for nickel. It is added to the molten nickel bath and is used in place of aluminium for the elimination of sulphur and oxygen because magnesium and nickel do not readily alloy whereas nickel and aluminium do.

In the organic chemical field the application of magnesium metal in the Grignard reaction is well known. Countless organic compounds owe their existence to a condensation or other reaction in which magnesium metal plays the key rôle. Last, but not least, is the application of magnesium in military pyrotechnics, which was largely responsible for starting the magnesium metal industry in America.

Electrolytic Copper

Few of us realise that a modern electrolytic copper refinery is not merely a plant for turning out pure copper, silver, gold, and platinum metals, but is, in fact, an inorganic chemical factory. For example, the copper refineries produce most of the "white arsenic" consumed in the insecticide industry. Another product of the copper refineries is selenium, practically all shipped to the glass factories to be used in making the red signal glass originally coloured by colloidal gold. Other by-products of the copper refineries are blue-stone, supplied to the insecticide factories for the manufacture of Bordeaux mixture, and nickel sulphate which is sold to the electroplaters.

The first American copper refinery was built at Newark, N.J., in 1883. By 1887 the total United States output of electrolytic copper was 24 tons per day as against over 2000 tons per day in 1940. Fifty years ago the United States' consumption of white arsenic totalled 600,000 lb. In 1940 it exceeded 60,000,000 lb. This hundredfold growth is a direct consequence of the introduction of the electrolytic processes. The United States now contributes half the world's requirements of arsenic, whereas in 1890 it imported 90 per cent. of its own requirements. Similarly, fifty years ago a few pounds of selenium were marketed at $15 to $30 per lb., but in 1940, the world produced almost a million lb. of selenium, selling for less than $2.00 per lb.

It is thus evident that the introduction of electrolytic processes into chemical industry has brought about a marked reduction in manufacturing costs resulting in a rapid increase in application of the products concerned. Better, purer, and more abundant products have resulted. In many cases entirely new industries were developed, economically impossible before the advent of electrolytic methods.

As to the future, it is difficult to predict without being fantastic. There will be electrolytic recoveries of many products now going to waste; electrolytic extraction of several valuable constituents from sea water; electrolytic isolation of new compounds unheard of to-day; electrolytic separation of isotopes; electrolytic fixation of nitrogen; production of old and new fabrics by electrophoresis; application of high-frequency currents to chemical reactions; electrolytic stimulation of plant growth; electrolytic production of foodstuffs, etc. Of special interest are the present indications and early prospects of far-reaching developments in the electro-organic field. By no other method or means than by the electrolytic is it possible to control and regulate reductions and oxidations of organic compounds to such a nicety.

REMARKABLE PROPERTY OF $MgCl_2$

Having read the above article on electrochemistry, chemists will more than ever value the following interesting, not to say surprising, piece of information, reprinted from a recent issue of a daily paper, under the heading 'Sea Fruit': "Huge plant being built on Gulf or Mexico, planned to treat 12,000,000 gallons of sea water a day, will extract valuable magnesium chloride, which, when refined, becomes aluminium."

A New Sugar Factory

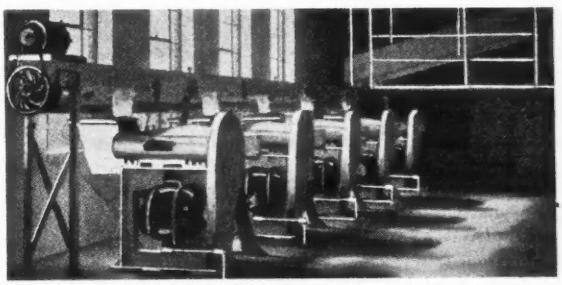
Important Development in Canadian Industry

THE first sugar factory in Manitoba, which was finished on October 1, 1940, according to schedule, is described in *Canadian Chemistry and Process Industries*, 1941, *25*, 2, pp. 55-58, by Mr. G. E. Hrudka, chief engineer and factory superintendent, Manitoba Sugar Co., Ltd., Fort Garry. Four sugar factories are already working in Canada, but long investigation was needed into the special conditions operating in the district.

Under the local climatic conditions, harvesting and delivery of beets have to be completed within a very short time, so that storage presents an important problem, perhaps 100,000 tons of beet requiring to be accommodated in the factory yard at one time. Unloading and piling operations are therefore entirely mechanised, and most of the beets delivered by rail during the harvest are dumped into hoppers and flumed into the factory for immediate consumption.

The header flume ends in a beet pump which, in recent installations, has replaced air lifts or beet wheels as it demands considerably less space. Both flume water and dirty beets are pumped into an overhead flume where trash and stones are removed by means of a trash catcher and rock catcher. Flume water is drained off before the overhead flume enters the beet washer where the beets are brought in contact with clean water for the final washing process. A roller table conveys the beets from the discharge chute of the washing machine to the boot of the elevator under a spray of fresh water. The bucket type beet elevator conveys the washed beets into the beet hopper over the picking belt with magnetic separator for tramp iron. Two beet cutters shred the beets into what are termed "cossettes." The beet cutters discharge the cossettes in a continuous stream on to the conveyor, where the cossettes are weighed. This conveyor in turn discharges into a drag conveyor from which, by means of chutes, cossettes can be charged into any of the 14 cells of the diffusion battery, each having a capacity of 325 cu. ft., corresponding to approximately five tons of cossettes. The diffusion process extracts the sugar—from 16 to 18 per cent. in beets—to about .2 per cent., obtaining what is termed "raw juice" on the one side and pulp and pulp water on the other. Raw juice enters predefecation tanks for cold pre-liming. About .2 to .3 per cent.. CaO on beets is added here. After pre-liming, juice is heated in vertical preheaters to 90° C. and pumped through a milk of lime feeder, the impulse of which measures the proper quantity of milk of lime for main defecation. This normally amounts to 2 per cent. CaO on beets. Predefecated raw juice and milk of lime enter first carbonation, in our case a Dorr type single tank carbonator, for continuous operation. A constant stream of CO_2 gas (30 to 35 per cent. CO_2) as obtained from the lime kiln, is forced into the juice at a pressure of 8 lb. causing precipitation of lime ($CaCO_3$). Proper circulation is assured by a recirculating pump capable of recirculating seven times the amount of juice.

Carbonated juice with a *p*H of 10.5 corresponding to approximately .09 per cent. CaO enters a 20 ft.-diameter 5-tray Dorr thickener at a temperature of 80° C. The bulk of the juice appears as clear overflow and is pumped through preheaters into the second carbonation while the accumulated solids with a density of approximately 30° Brix are pumped to three rotary vacuum filters, 8 ft. in diameter and 12 ft. face, for filtration and washing. While the filtrate and wash water are used for lime slacking in the lime house, filter mud is



Dewaterer and pulp press station for exhausted pulp

re-mingled and pumped into settling ponds in the yard. This lime mud consists largely of calcium carbonate with small amounts of nitrogen, phosphoric acid, and potassium. It is a very efficient lime fertiliser, being a precipitate surpassing in fineness the finest ground product of lime rock, although very little use has been made of this by-product in America as compared with Europe.

Final Filtration

In the second carbonation, lime in solution is reduced to .002-.003 per cent. CaO. Three filter presses of 700 sq. ft. filtering surface each are employed to remove the mud thus obtained. The clear juice passes through the sulphitation tower where it is treated with SO_2 gas as an agent for decolorisation and lowering of viscosity. The juice, with a *p*H of 8 to 8.5 is again heated to boiling point and brought in contact with a small amount of activated carbon and diatomaceous earth as a filter-aid. The juice then passes its final filtration through three plate and frame filter presses as before and the straw-coloured thin juice thus obtained is pumped through preheaters into the first body evaporator with a temperature of approximately 125° C.

The evaporation station is a condenserless quadruple-effect system with boiling temperatures of 125, 116, 105 and 95° C. All vapours from first, second, third and fourth body are completely utilised for pan boiling and preheating so that no vapour enters the condensers, thus avoiding any condenser losses. "Thin juice" of 12-14° Bx. is normally concentrated to "thick juice" of 65° Bx. (total solids). A total heating surface of 28,000 sq. ft. is provided in the form of vertical, calandria type steam chests with 1¼ in. steel tubes. A special baffle system is provided for rapid forced circulation. Dished-in bottoms reduce any dead space to a minimus.

Entirely new, and hitherto unknown in America, is the disposal of condensate by the so-called Niessner system. The four collectors, corresponding to four kinds of vapour,

General view of the sugar beet plant, with warehouse and offices, erected last year in Manitoba

employ no valves, traps or other movable parts. They collect all condensate throughout the factory, with the exception of the heaters for the diffusion battery for which a separate pump is provided. The amount of condensate used for boiler feed is automatically branched-off into the feed tanks, which are automatically kept at full level under a pressure of 25 to 30 lb./sq. in. The surplus condensate is pumped into a high storage tank from which it is distributed to the various points of consumption. The arrangement of the evaporators across the main building, with all the preheaters lined up immediately behind on the pan floor, separates the beet end from the sugar house, also allowing a minimum length of large diameter vapour pipes.

The sugar house is equipped for a straight three-boiling system consisting of six vacuum pans, two of each provided for white sugar, intermediate sugar and low-grade sugar. Affinated intermediate sugar and affinated low-grade sugar are remelted and the combined filtered re-melt boiled into white sugar together with thick juice. The white sugar pans discharge into a sugar mixer equipped with both agitators and reheating coil. Three high-speed gear-driven centrifugals are provided for white sugar spinning.

Pulp-Drying Plant

As late as the end of June last the company decided to put in a drying plant for pulp, which was also completed for the beginning of the season. It consists of a drying drum, 10 ft. 6 in. in diameter and 48 ft. long, with a Buttner narrow baffle system. The flue gas for direct drying is provided by a stoker of the same design as in the boiler house, set up in a Bigelow type furnace refractory. The entire output of wet pulp with 80 to 85 per cent. moisture is dried to either plain pulp or " molassed beet pulp " in which case up to 25 per cent. molasses is added prior to drying.

Canadian Chemical Industry

All-round Increase in 1939

ACCORDING to figures just released for 1939 all but two of the thirteen Canadian chemical industries have reported gains. Among the industries showing increased output are compressed gases, coal-tar distillation, hardwood distillation, soaps, washing compounds, and cleaning preparations. The gains range from 7 per cent. in compressed gases to 26 per cent. in coal-tar distillation. In hardwood distillation the increase is 8 per cent. and in soaps and related products 10 per cent. The total output for the chemical group rose about 8 per cent. from $146,139,000 in 1938 to $157,407,000 in 1939—the latest year for which figures are available. The 1939 production value has set up a new high record.

The value of production in the compressed gases industry in 1939 was $4,010,000 as compared with $3,754,000 in 1938. The number of plants rose from 1 to 31 and the capital from $4,939,000 to $5,501,000; but the cost of materials declined slightly from $506,000 to $501,000. The chief products of the industry were oxygen, acetylene, and carbon dioxide (in cylinders). The output of oxygen increased 8.1 per cent. to 189,031,000 cu. ft.; acetylene 7.1 per cent. to 48,616,000 feet; and carbon dioxide 7.3 per cent. to 7,682,000 lb. The output of hydrogen rose 44.4 per cent. to 50,498,000 cu. ft.

The output in the coal-tar distillation industry was valued at $3,648,000 as against $2,895,000. The number of plants reporting rose from 10 to 11 and the capital from $4,781,000 to $4,940,000; while the cost of materials advanced from $1,742,000 to $2,109,000. Canada is an importer of crude tar, coal pitch, carbolic or heavy oil, and benzol for blending with gasoline. Exports include coal tar and pitch, creosote oil and other tar oils. Production in the hardwood distillation industry advanced from $682,300 to $737,700. The number of plants remained unchanged at 5, but the capital employed declined slightly, while the cost of materials rose from $373,800 to $415,900. Products made for sale in 1939 included 2,172,000 bushels of charcoal, 4,348,000 lb. of grey acetate of lime, and 335,000 imperial gallons of refined methyl hydrate. The Dominion is an importer of methyl hydrate, charcoal, acetate of lime, acetic and pyroligneous acid, and formaldehyde.

In the soaps, washing compounds, and cleaning preparations industry production increased from $18,242,000 to $20,145,000 in 1939. The number of plants rose by 1 to 110 and the capital increased from $13,347,000 to $14,891,000; but the cost of materials declined from $9,224,000 to $9,171,000. Among the chief products of the industry were 14,944 tons of toilet soaps valued at $4,439,000; and 33,938 tons of laundry and household soaps at $3,349,000; 22,931 tons of soap flakes and chips at $3,314,000; and 22,315 tons of soap powders at $3,591,000. Imports of soaps into Canada were valued at $565,900 and exports at $643,900.

Mercury in South Africa

Small but Increasing Native Production

WITH the exception of occasional small consignments from Mexico, practically the whole of South Africa's requirements of mercury for use in the amalgamation process and in the manufacture of explosives, pigments, scientific instruments, and in medicine were formerly obtained from the Spanish and Italian mercury deposits, a total of 69,648 lb. being imported in 1937, 46,610 lb. in 1938, and 80,386 lb. in 1939. Prospectors and other interested parties have, therefore, always been particularly alert for indications of the existence in South Africa of cinnabar, the common sulphide of mercury. According to the *Mineral Resources of South Africa* (Third Edition, Union of South Africa Department of Mines, 1940), however, out of a considerable number of alleged occurrences which have been reported by native headmen, witch doctors, and others from time to time, none, upon more detailed and scientific investigation, has ever been substantiated. These alleged occurrences almost invariably turn out to be either fused and recrystallised imported cinnabar or else there has been confusion with minium, the red oxide of lead, or even the earthy varieties of hæmatite, whilst the existence of native mercury, as may well be expected, has originated from the adventitious salting of alluvials by globules of mercury from old amalgamation operations.

According to the geological survey, the principal authenticated occurrences of cinnabar in South Africa are those in the Lomati valley, about 25 miles from Hectorspruit on the Delagoa Bay railway in the Barberton district of the Eastern Transvaal, on the farms Bynestpoort No. 520 and Kameelfontein No. 106 in the Pretoria district, and at Monarch Kop in the Letaba district on the Murchison range, east of Leydsdorp.

The Hectorspruit deposit occurs in gritty felspathic quartzite and, except for high-grade float on the farm Singerton, the mineral is found in shear zones as streaks, clusters, or lenses with a sericitic crushed quartzite gangue, though some cinnabar has been found in quartz stringers in the quartzite. Payable deposits of this mercury ore have not yet been proved, however, though it is believed that more promising deposits in the shear zones may await discovery.

In the second group of deposits, those on the farms Bynestpoort and Kameelfontein, immediately west of the Premier mine, cinnabar occurs as small specks and patches up to a centimetre in diameter in and adjoining a brecciated zone in Magaliesberg quartzites. Another mode of occurrence is as a fine dust-like covering on quartz crystals in cracks and druses.

The Monarch Kop deposit, which was discovered in 1936, is at least several hundred feet in length and from 15 to 20 ft in width. Here the cinnabar occurs with lenticles of quartz and carbonate in chlorite-carbonate schists. These deposits are now being worked, and the output of mercury, though small, is steadily increasing. (*Bull. Imp. Inst.*, 1940, *38*, 4, 486-7).

General News

THE CHINA CLAY TOWN of St. Austell has done well for the War Weapons Week, which ended on March 15, when over £250,000 was raised.

THE COUNCIL OF THE INSTITUTE OF FUEL has decided that no entrance fee will be required from new members until some date subsequent to December 31, 1941.

THE NATIONAL FEDERATION of Associated Paint, Colour, and Varnish Manufacturers of the United Kingdom announces a further all-round increase forthwith in the prices of paints, varnishes and lacquers.

ATTENTION IS DIRECTED to the change of address of Mr. G. Taylor, F.I.C., Hon. Treasurer of the Society of Public Analysts and other Analytical Chemists. This is now: Peek House, 20 Eastcheap, London, E.C.3.

THE ROYAL SOCIETY gave a luncheon on Thursday last week to Dr. J. B. Conant, President of Harvard University, who is visiting this country on a scientific mission. In a short address Dr. Conant emphasised the eagerness of American academicians to help in the war effort against Germany.

THE POSSIBILITY of Northern Ireland undertaking, for the duration of the war, work of firms in Great Britain affected by the concentration of industry policy is being discussed in London by Sir Basil Brooke, Northern Ireland Minister of Commerce, and Government representatives.

AGENCY REPORTS ANNOUNCE that an order to deliver its entire output of magnesium for March to Britain has been given to the Dow Chemical Company. British orders are in future to be given priority in magnesium production. These instructions have been given by Mr. Edward Stettinius, head of the U.S. War Resources Board.

FULL INFORMATION ABOUT THE INSTITUTE OF FUEL is contained in a booklet published this week by the Institute, from 30 Bramham Gardens, London, S.W.5. It contains a statement on the origin and purpose of the Institute, a full list of members of all categories, and a chronological list of papers presented, with the issues of the Institute's journal in which they have been published.

THE MINISTRY OF SUPPLY has, in response to representations made by the British Standards Institution, agreed, as a wartime concession, to allow the conditions applicable to the carriage of paints on passenger ships with a flash point of 93° F. to be extended to liquids having a flash point of 88° F. This concession is a considerable help to export and the increase in the available shipping space for paint materials will be most welcome.

HALIFAX PASSENGER TRANSPORT DEPARTMENT is prepared, subject to the approval of the Ministry of Transport, to run Corporation buses on a mixture of 30 per cent. creosote and 70 per cent. Diesel oil. Results of experiments made with a group of vehicles have been sent to the Petroleum Section of the Mines Department. Mr. G. F. Craven, manager of Halifax Transport, has found that the mixture gave more miles per gallon, but cost about the same as Diesel fuel oil, as it became necessary for the oil to be changed more frequently. Difficulty in obtaining supplies of creosote was another problem that would be involved if the mixture came into general use.

Foreign News

THE COMMERCIAL SECRETARY to H.M. Legation at Lima reports that, by a resolution dated January 2, the export from Peru of used or scrap copper has been prohibited.

THE EXPLOSION THAT OCCURRED near the Hercules Powder Company's factory at Kenvil, N.J., on Thursday last week, took place in a refuse dump, causing no casualties or damage.

CINNABAR CONTAINING 79.45 per cent. of mercury is reported as being mined at Don Bosco, Mines Geraes, Brazil. Output figures are not available.

EFFORTS ARE BEING MADE by the Canadian Government to increase production of barytes. The total output in 1939, however, reached only 300 short tons. High grade deposits have recently been discovered near Windsor, Nova Scotia, in addition to the small deposits already tapped in Nova Scotia, Quebec and Ontario.

From Week to Week

THE RECENT BOOKING OF 100,000 TONS OF BAUXITE for shipment through Santos to the United States has been instanced in support of a statement that a plant for the production of aluminium from Brazilian bauxite is being considered.

AN AMERICAN PETROLEUM COMPANY, according to a statement in *Foreign Commerce Weekly*, has obtained a concession from the Sheikh of Kuwait to exploit the sulphur deposits of his territory in the Persian Gulf.

DETAILS OF THE PROPOSED MERGER of the International Agricultural Corporation and the Union Potash and Chemical Co., of Colorado, which was to take place this month, are given in the February 15 issue of the *American Fertilizer*. The agreement provides for a change of name of the combined company to International Minerals and Chemical Corporation.

IN SPITE OF WAR CONDITIONS, the export from America to Europe of scientific and laboratory equipment in 1940 was valued at $1,744,837, an increase of 114 per cent. over 1939. An unusual development, reported in *Foreign Commerce Weekly*, was the large increase in exports to Sweden, which rose from $43,343 to $717,538.

A PROJECT FOR THE ERECTION of a caustic soda plant in Brazil, to employ the Solvay process, has been the subject of recent study, and it is reported that a mission of British technologists has been further examining the matter on the spot during the current month. Should the proposition prove to be economic, a plant would be erected during the next two or three years, at a cost of about £1¼ million.

Forthcoming Events

A MEETING of the Electrodepositors' Technical Society will be held at the Northampton Polytechnic, St. John Street, Clerkenwell, London, E.C.1, on March 31, 1941, at 3.30 p.m. The following papers will be presented: "B.N.F. Jet Test for Determining the Thickness of Silver Coatings," by Mr. R. A. F. Hammond, and "Research in Progress at the National Bureau of Standards," by Dr. Wm. Blum. The chair will be taken by the President, Dr. H. J. T. Ellingham.

AT THE MEETING of the Road and Building Materials Group, Society of Chemical Industry, at 4.30 on April 1, at the rooms of the Chemical Society, Burlington House, Piccadilly, S.W.1, Mr. H. M. Llewellyn, of the Building Research Station, will speak on "Anti-scatter Treatment of Glass."

A MEETING OF THE Society of Public Analysts and other Analytical Chemists will be held at 4 p.m. on April 2, in the Chemical Society's Rooms, Burlington House, Piccadilly, W.1. Three papers will be presented and discussed: "The Determination of Total Solids in Tomato Purée," by G. W. Monier-Williams, O.B.E., M.C., M.A., Ph.D., F.I.C.; "The Determination of Arsenic in Foodstuffs Contaminated with War Gases," by H. Amphlett Williams, A.C.G.F.C., F.I.C.; and "The Rapid Determination of Arsenic in Foodstuffs Contaminated with Lewisite," by W. J. Stainsby, B.Sc., Ph.D., A.I.C., and A. McM. Taylor, B.Sc., A.I.C.

THERE WILL BE A MEETING of the Institute of Fuel on April 3 at the Connaught Rooms, Great Queen Street, Kingsway, London, W.C.2, at 2.15 p.m., when Mr. J. G. Bennett (director, the British Coal Utilisation Research Association) will present a paper entitled: "How Far is the Proximate Analysis a Reliable Guide to Coal Behaviour."

THE NINETEENTH ANNUAL CORPORATE MEETING of the Institution of Chemical Engineers will be held in the Connaught Rooms, Great Queen Street, London, W.C.2, on April 4. The business session (Corporate Members only), for the election of officers, etc., will start at 11 a.m., and will be followed by the President's address on "Some Post-War Problems" at 11.45. At the luncheon (12.45 p.m.) the principal speaker will be the Rt. Hon. A. V. Alexander, M.P., First Lord of the Admiralty.

THE NEXT MEETING of the London Section of the Society of Chemical Industry will be held at Burlington House, in the rooms of the Chemical Society, at 2 p.m., on April 7, when Mr. N. E. F. Hitchcock, of Messrs. C. C. Wakefield & Co., Ltd., will read a paper on "The Production, Testing, and Application of Lubricants." The meeting will be of special interest to chemical engineers who are invited to attend.

Personal Notes

LIEUT.-COL. SIR JOHN GREENLY, K.C.M.G., has agreed to continue in office as President of the Institute of Fuel for the current year.

MR. FREDERICK HENDERSON COPE, assistant works chemist, South Metropolitan Gas Company, has been commended for brave conduct in civil defence.

DR. THOMAS SWINDEN, director of research to the United Steel Companies, Ltd., Sheffield, has been awarded the Bessemer medal for distinguished services in metallurgy. He is the seventh Sheffield man to gain the honour.

DR. KATHLEEN HODKINSON, only daughter of Mr. and Mrs. R. G. Hodkinson, was married at Wigan, this week, to 2ND-LT. HAROLD TRELEVEN FOST, R.H.A. (H.A.C.), of Mill Hill, Middlesex. The bride's father is the managing director of Phillips & Sons, Ltd., chemists, Wigan.

MR. H. E. J. CORY, M.Sc.Tech., M.I.Chem.E., has resigned from the position of managing director of the Eaglescliffe Chemical Co., Ltd., but is retaining his seat on the board. He has opened his own business as manufacturer, agent, and merchant in the paint, lacquer, textile, and similar industries, at the Eagle Chemical Works, Church, near Accrington, Lancs.

Among the 20 new admissions to the Fellowship of the Royal Society announced last week were: PROFESSOR H. W. MELVILLE, Professor of Chemistry, Aberdeen, formerly Fellow of Trinity College, Cambridge; MR. J. NEEDHAM, Reader in Biochemistry, Cambridge, and Fellow of Gonville and Caius College; SIR DAVID RIVETT, deputy chairman and chief executive officer, Australian Council for Scientific and Industrial Research, formerly Rhodes Scholar (Australia) and Professor of Chemistry, Melbourne; and PROFESSOR ALEXANDER ROBERTSON, Professor of Organic Chemistry, Liverpool.

OBITUARY

MR. WILLIAM SMITH, who died recently at Gosforth, aged 82, was, for 50 years associated with the Washington Chemical Co., in County Durham. He had also been a magistrate for the county of Durham for many years.

MR. WILLIAM SLACK, whose death by enemy action this month is announced, was managing director of the Modern Electric Welding Co., Stobcross, Glasgow. Mrs. Slack was another victim of the same incident, and a funeral service was held at the Maryhill Crematorium on Monday last.

DR. LUDWIG VON NEURATH, who died at Torquay on March 7, aged 74, was formerly a leading figure in the Austrian and Hungarian petroleum industry, and founded the petroleum cartel. He was a brother of Dr. Frederic Neurath, chemical engineer, who has frequently contributed to THE CHEMICAL AGE.

MR. FRANK BROWN, M.A., whose recent death at the age of 45, at Breaston, Derbyshire, is announced, was well known as a dyestuffs chemist. At the end of the last war he was engaged on anti-gas research, but soon afterwards he was appointed works chemist to Kearns (yarn dyers), of Rossendale. In 1930 he joined the dyestuffs research staff of British Celanese, Ltd., and specialised in the synthesis of anthraquinone type dyestuffs for them.

DR. WILLIAM LAWTON GOODWIN, F.R.S.C., whose death on January 17 at the age of 84 is reported from Canada, was among the best known of Canadian mineralogical chemists. Dr. Goodwin was born at Baie Verte, New Brunswick, and, from Mount Allison University in that province, won a scholarship in 1877 which enabled him to study at Edinburgh, London, Heidelberg (with Bunsen), and Bristol (with Ramsay). Returning to Canada, he accepted in 1883 the appointment of Professor of Chemistry at Queen's University, Kingston, Ontario, and in 1890 was made Director of the new school of mining there. From his retirement in 1921 he devoted himself specially to the spread of practical teaching in chemistry and mining.

MR. W. DE C. KESSLER, whose death on February 4, at the age of 75, is reported from Montgomery, Alabama, was Division Manager of the American Agricultural Chemical Co. He was from 1889 associated with the Goulding Fertiliser Co., a subsidiary of W. and H. M. Goulding, Ltd., of Dublin, Ireland, and supervised the erection of the first plant in America for the manufacture of double superphosphate, at Pensacola, Florida. In 1905-6 he was president of the Fertiliser Manufacturers' Association.

DR. F. W. SKIRROW, whose recent death at Morecambe, Lancs., is reported, had been since 1930 Technical Director of Shawinigan Chemicals, Ltd., London. He was a chemist with the National Physical Laboratories in 1902 and later did research work for Hardman and Holden, Ltd., tar distillers, and the Manchester Oxide Co., Ltd., before crossing the Atlantic. After 1915 he was assistant professor of chemistry at McGill University, where he made his first connection with Shawinigan Chemicals. His special work for that company lay in the production of vinyl acetate resins and he was the co-inventor, with Morrison and Blaikie, of the first U.S. patent covering that field of chemical industry.

A Brilliant Electrochemist

Death of Mr. John Rhodin

BY the death of JOHN GUSTAF ADOLF RHODIN, F.I.C., which occurred at Ilford on March 20, chemistry in Britain, and especially electrochemistry, has lost a very remarkable personality. Rhodin was born a Swede, and remained a Swede until the end, and he had the distinction of being one of the only two foreigners who remained members of the Institute of Chemistry after the alteration of its rules in 1920.

Rhodin was born in Sweden in 1870 and educated at Gothenburg Reallläroverk; he matriculated at Vänersborg in 1888 and entered Uppsala University in 1888. In 1890 he was assistant to J. Alen as municipal analyst of Gothenburg and in the same year presented his first paper (on a hydrostatic pycnometer) to the Swedish Chemical Society. Two years as chemist to the Swedish Moor Cultivation Society preceded his arrival in England in 1892, where he acted as assistant to J. M. Swan (later Sir Joseph) and was the author (in 1894) of a paper, presented to the Royal Society, on certain properties of pure electrolytic copper. For three years he was chief chemist of the Chloride Electrical Storage Syndicate, Ltd., Manchester, and while with them produced his notable series of patents covering several electrochemical methods which have been adopted on a large commercial scale. From 1896 he practised independently in Manchester for several years, and subsequently held appointments with the Muntz Metal, Westinghouse, Raphael's Refinery, and British Celanese companies, before re-establishing himself in private practice at Ilford. He had become a Fellow of the Institute of Chemistry in 1899 and was elected Life Fellow in 1940.

Rhodin was not merely a chemist of genius; he was also a brilliant physicist and mathematician and a fine linguist. His occasional contributions to THE CHEMICAL AGE were of the greatest value and interest, and were written in perfect and lucid English. His death at the age of 69 came unexpectedly. After a night's duty as fire-watcher, he had a stroke on returning home, and, after partial recovery, he died several days later.

Licensing Department's New Address

The Board of Trade announces that the address of the Import Licensing Department, on and after April 1, and the Machinery Licences Division of the Industrial Supplies Department, on and after April 3, will be 1-6 Tavistock Square, London, W.C.1. Tel.: EUSton 4433.

THE DENVER EQUIPMENT CO., Denver, Colorado, and 493a Northolt Road, South Harrow, Middlesex, has issued an illustrated pamphlet (Bulletin P8-B) describing the Denver Diaphragm Pumps which are especially designed for use with thickened or high specific gravity pulps or sludges.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

F. D. LOMAS & SON, LTD., London, S.E., sheet metal workers. (M, 29/3/41). February 28, mortgage, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on a contract. *Nil. June 18, 1940.

JAMES DAVIES (LONGTON), LTD., colour manufacturers, (M, 29/3/41). February 25, debenture to Lloyds Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *Nil. July 31, 1940.

Satisfactions

BAIRD & TATLOCK (LONDON), LTD., London, E.C., laboratory furnishers, etc. (S, 29/3/41). Satisfaction March 3, of debentures registered May 24, 1932, to the extent of £1000.

Company News

Blythe Colour Works, Ltd., announce a final dividend of 5 per cent., less tax, for the year 1940 (20 per cent.). Net profit £18,679 (against £38,831).

F. W. Hampshire & Co., Ltd., manufacturing chemists, have declared a final dividend of 20 per cent., making 40 per cent. (same), and a bonus of 10 per cent. (same).

General Refractories, Ltd., report a trading profit of £189,436 (last year, £163,706) and last year's dividend of 5 per cent. is repeated. Meeting, Royal Victoria Hotel, Sheffield, April 1.

The British Oxygen Co., Ltd., announces a final ordinary dividend or 8 per cent., making 15 per cent. for 1940. Last year, 17 per cent. and capital bonus of 20 per cent.

Benzol & By-Products, Ltd., are paying, on March 31, a dividend of 3 per cent, on account of arrears on cumulative preference shares, in respect of the six months ender September 30, 1929.

The Anglo-Chilean Nitrate Corporation reports a net profit, to June 30 last, of £664,006 (£470,681). Interest of 4½ per cent. is being paid on sterling First Mortgage Income Debenture stock and on dollar Sinking Fund Income Debentures.

The Lautaro Nitrate Co., Ltd., announce a total income of £876,531 (£641,165 last year). Interest of 4 per cent. is being paid on the dollar issue of First Mortgage Income Bonds and the two sterling issues of First Mortgage Income Debenture stock.

The British Aluminium Co., Ltd., shows a trading profit of £900,602, against the record figure of £1,058,772 last year. A final dividend of 7 per cent. (8½ per cent.) is being declared, making a total of 10 per cent. (12½ per cent.).

Worthington Simpson, Ltd., are declaring a final dividend of 7 per cent., less tax, for 1940 (10 per cent.). Profits were £20,279 (against £37,241); £22,799 forward (last year £19,327 and £10,000 to general reserve). Meeting, Connaught Rooms, Great Queen Street, W.C.1., April 4.

Monsanto Chemicals, Ltd., announce a profit for 1940, after providing for taxation and depreciation, of £105,854 (£123,863). Set aside preference dividend for 1940, £13,063 (£14,712); final ordinary dividend in respect of 1939 paid during 1940, free of tax, £70,000. No dividends are declared for 1940, compared with 33⅓ per cent., for 1939.

Chemical and Allied Stocks and Shares

STEADY demand has again been in evidence for British Funds and other high grade investment stocks, but elsewhere the prevailing tendency was to await the Budget, and sentiment generally was also influenced by uncertainty as to the next developments in the war. Nevertheless, there was again little selling, and market values showed only small movements as compared with a week ago. A further increase in the high level of taxation is regarded as inevitable, but it is not generally expected the Budget will depart from conventional taxation methods. There are continued hopes, however, that there will be some modification of E.P.T., in order to make the incidence of the latter less inequitable. The extent to which the weight of taxation bears on some companies was illustrated this week by the results of Monsanto Chemicals for the past year. Gross profits at £151,603 record an increase of £198,734, but provision for taxation absorbs as much as £286,549, compared with £80,157 in the previous year, and net profits at £105,854 show a reduction of £18,009.

Pending the dividend announcement, there was again a fair amount of activity in Imperial Chemicals, which, as compared with a week ago, have improved further from 29s. 6d. to 30s. 1½d. Moreover, the 7 per cent. preference units made the higher price of 32s. 4½d. Business at 60s. was recorded in B. Laporte, and Greeff-Chemicals Holdings 5s. units were around 5s. 9d. On balance, Borax Consolidated deferred have improved from 27s. to 27s. 9d., while the preferred units were also better, and business in the 4½ per cent. first debentures took place at 104½. Courtaulds at 30s. 3d. have failed to keep best prices recorded during the past few days, there being considerable divergence of opinion in the market as to the amount that is likely to be realised from the sale of the shares of the company's American subsidiary. On the other hand, British Celanese issues showed some improvement following a revival of market talk of the possibilities of an eventual merger with Courtaulds, but it need hardly be mentioned that gossip of this kind is entirely without confirmation. Associated Cement remained under the influence of the reduced dividend, and other cement shares were inactive, although elsewhere some attention continued to be given to British Plaster Board 5s. ordinary, which were around 13s. The units of the Distillers Co. were lower at 60s. 6d., but United Molasses were fairly steady around 23s. Dunlop Rubber changed hands fairly actively around 33s. Monsanto Chemicals 5½ per cent. preference shares continued to be quoted at 22s. 6d. A further improvement from 67s. 6d. to 69s. 4½d. was recorded in Turner & Newall, and Murex were firm at 80s., while the general tendency among iron and steel securities appeared to be firmer, it being pointed out that companies in the heavy industries are among those which would probably benefit most from any modification of E.P.T. Dorman Long were 17s. 6d., Stewarts & Lloyds 42s. 7½d., and United Steel 20s. 3d., while Babcock & Wilcox changed hands around 39s. 6d. following publication of the full results. Baldwins 4s. units were quoted at 4s. 7½d.

Lever & Unilever were maintained at 22s. 6d., and quotations for the preference shares were also unchanged on balance. Buyers were in evidence for British Oil & Cake Mills preferred ordinary, which improved to 37s., having remained under the influence of the maintenance of the dividend at 12½ per cent. International Paint were higher, and Pinchin Johnson at 18s. 3d. were virtually the same as a week ago, while Lewis Berger were 44s. 6d. An improvement from 19s. 6d. to 20s. was made in Wall Paper Manufacturers deferred units, but elsewhere, Blythe Colour were lower on the reduced dividend. Business at 31s. 3d. was recorded in Fison Packard, and Goodlass Wall 10s. ordinary changed hands slightly over par. Morgan Crucible 5 per cent. second preference transferred at 20s., and Sanitas Trust preference shares around 23s. General Refractories at 8s. 1¼d.xd. were little changed on the financial results. British Aluminium had a firmer appearance at 39s. 6d. on the very strong finances again shown by the accounts, and British Oxygen were steady around 65s. Boots Drug were slightly lower at 34s. 6d., while elsewhere, British Drug Houses were 23s., and Beecham's Pills deferred shares transferred around 8s. Oil shares were lower on balance.

British Chemical Prices

Market Reports

THERE are no outstanding movements to record in the market for general chemicals this week, a fair demand being maintained in most sections. Makers' deliveries are proceeding along steady lines and, so far as a number of potash and soda products are concerned, supplies are limited with distribution confined to small quantities for immediate requirements. As a result of the increase in the price of crude iodine the makers' scale of prices for iodides has been revised. Business in the market for coal tar products has been on a fair scale, the chief demand being for such items as toluol, xylol, and solvent and heavy naphthas. Only a small interest has been displayed in pyridine, whilst some improvement can be recorded in the demand for cresylic acid for overseas destinations.

MANCHESTER.—Generally stable price conditions continue on the Manchester market for chemical products, both light and heavy, though actual changes on balance have been relatively few. The possibility of a reduced consumption of a wide range of textile chemicals is not lost sight of locally, though for the time being the movement is on a fair scale, whilst steady quantities are being taken up by most of the other leading consuming industries. In the by-products section the demand for crude tar, creosote oil, and most of the light materials this week has been brisk, and quotations are very firm.

GLASGOW.—Business in general chemicals for home trade has been rather quieter during the week, but there has recently been rather more enquiry for export. Prices generally continue very firm, and where altered are slightly dearer. Acids (hydrochloric, sulphuric, and battery) have risen sharply during the week.

Price Changes

Potassium Iodide.—B.P. 8s. 8d. to 12s. per lb., acording to quantity.
Sodium Iodide.—B.P. for not less than 28 lb., 9s. 6d. per lb.; for not less than 7 lb., 13s. 1d. per lb.

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